

Remarks

Applicants have requested amendments to claims 1–3 to further distinguish the claimed invention from those described in the cited references. Support for the amendments to the claims may be found throughout the present application as originally filed, as well as in its priority applications. For example, the amendments to claim 1 are supported at page 33, lines 24–25; the amendment to claim 2 finds support at page 22, lines 20–24; and the amendment to claim 3 finds support at page 16, lines 17–18 of the present application as originally filed.

New claims 4–13 also are supported throughout the present application and its priority applications. Exemplary support for new claim 4 and 5 is found at page 7, lines 2–5; page 16, lines 17–18; and page 4, lines 17–20 of the present application as originally filed. Likewise new claim 6 finds support, for example, at page 13, lines 15–16. New claims 7–11 find support at page 13, lines 5–16, and claim 12 is supported at page 17, lines 15–16 and page 18 lines 2–3. New claim 13 is supported, for example at page 22, lines 20–24. Thus, the new claims add no new matter.

The Office communication raises several issues with respect to the present application. These are addressed in turn below.

I. Priority

The Office communication alleges that applicants are not entitled to claim the benefit of the earlier filing date of prior Application Nos. 10/013,334; 09/085,390; and 60/047,804, because the present application allegedly adds and claims additional disclosure not presented in the prior applications. Applicants disagree with these allegations and maintain that all claim terms are fully supported in applicants' earliest priority application 60/047,804 and therefore that Applicants are entitled to the filing date of May 27, 1997, as their earliest priority date.

Specifically, the term “linear” is understood by those of skill in the art and is explained, for example, at page 4, lines 4–7 of prior Application No. 60/047,804.

The feature “predetermined positions” also is supported in prior Application No. 60/047,804, for example, at page 6, lines 12–13, which describe “attaching molecular scaffolds to substrates in predetermined patterns.”

The claim feature "organized" finds support throughout the priority applications, for example in Application No. 60/047,804 at page 16, lines 1-7, which describes "methods for forming organized molecular arrays."

The claim feature "electrically isolated" is supported, for example, at page 6, lines 30-32 of Application No. 60/047,804, which describes a tunnel barrier, i.e., a barrier to current flow.

The claim feature "current above a threshold in applied voltage" is supported throughout the priority applications and is specifically demonstrated in Example 5 at page 24 of Application No. 60/047,804. Moreover such an increase in current above a threshold in applied voltage is illustrated in FIG. 4 of this provisional application.

Thus, because all claim terms are supported in priority Application No. 60/047,804, applicants maintain that the present application complies with the requirements of 35 U.S.C. sections 119(e) and 120 and is entitled to the priority date of May 27, 1997. Nonetheless, solely to expedite prosecution, applicants have amended the claims so that the allegedly new matter is not recited in the claims, with the exception of "predetermined positions" in claim 4.

II. Claim Rejections Under 35 U.S.C. §112

Claims 1-3 are rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the invention. Specifically, the Office communication alleges that the term "biomolecular scaffold" is indefinite. Applicants disagree. This claim term is clear to a person of skill in the art on its face. Moreover, the term finds specific support in the application as originally filed. Nonetheless, solely to advance prosecution, applicants have requested that the objected-to term be replaced with polylysine.

The Office communication also alleges that the term "one-dimensional array" is confusing and, hence, is indefinite. Applicants disagree with this allegation as the term is well understood to those of skill in the art. Moreover, the specification makes clear the meaning of the term one-dimensional array. Specifically, the Examiner appears to be confused as to the absence of presence of x and y dimensions in addition to a z dimension in the claimed arrays.

The application describes arrays, such as in Example 4 of the application as originally filed, of molecular dimension, i.e., arrays having nanoclusters arranged in a line of about one molecule thickness. Applicants consider such a line to be a one-dimensional array.

Moreover, the term "one-dimensional array" as used by applicants is consistent with the understanding of those of skill in the art as evidenced by Andres *et al.* of record. Indeed, Andres refers to a monolayer as a two-dimensional array, i.e., the monolayer has x and y dimensions, in addition to a molecular thickness in the z axis. Such an arrangement is not considered to be a three-dimensional array, but rather is considered in the art to be a two-dimensional array. Therefore, applicants submit that usage of the claim term "one-dimensional array" is definite, and satisfies the requirements of 35 U.S.C. § 112. Nonetheless, solely to expedite prosecution, the claims have been amended to remove the allegedly confusing term "one-dimensional" from the claims. Applicants respectfully request that the rejections under 35 U.S.C. § 112 be withdrawn.

III. Claim Rejections Under 35 U.S.C. §102

The Office communication states that the claim features "electrically isolated from one another" and "having a linear increase in current above a threshold in applied voltage" address product-by process limitations and/or address inherent characteristics and thus are not afforded patentable weight. Applicants disagree as these claim features reflect structural features of the claimed arrays and submit that all claim features should be considered.

Claim 1 is rejected as allegedly being anticipated by U.S. Patent No. 6,159,620 to Heath *et al.* (Heath). Applicants note that Heath is not prior art and therefore request that this rejection be withdrawn. The present application is entitled to the benefit of the earlier filing date of prior provisional patent Application No. 60/047,804 filed May 27, 1997. Heath was filed March 31, 1998.

Moreover, solely for purposes of discussion, even if Heath is considered to be prior to the present application, it does not teach or suggest several features of applicants' claims. For example, Heath fails to teach applicants' scaffold. Additionally, Heath fails to teach such a polylysine scaffold being coupled to a substrate as recited in applicants' claims. Because Heath is not prior to applicants' priority date and because Heath fails to teach the features of applicants' claims, applicants request that the rejections over Heath be withdrawn.

Claim 1 also is rejected under 35 U.S.C. §102 as allegedly being anticipated by Peschel *et al.* Applicants traverse this rejection and request that it be withdrawn. As indicated by its title, Peschel is concerned with the "first steps towards ordered monolayers of ligand-stabilized gold

clusters." Peschel is directed to forming monolayers of cluster materials, i.e., deposition of clusters in two dimensions. Accordingly, Peschel fails to teach several features recited in applicants' claims, including a polylysine scaffold. Instead, Peschel indiscriminately deposits clusters on poly(ethyleneimine)-coated platelets and thus also does not couple a scaffold to a substrate in a predetermined position as recited in applicants' claim 4. Peschel also fails to teach the patentable combinations of features recited in the claims as currently amended, such as scaffolds having a lateral definition of about 10 Å. Indeed, Peschel's monolayers do not appear to have any particular order or lateral definition.

Claims 1 and 2 are rejected under 35 U.S.C. § 102 as allegedly being anticipated by Alivisatos *et al.* Applicants traverse this rejection and request that it be withdrawn because Alivisatos fails to teach several features of applicants' claims. For example, Alivisatos fails to teach or suggest a polylysine scaffold. Instead, Alivisatos is directed to DNA–nanocrystal conjugates. See, for example Alivisatos at page 609. Alivisatos fails to teach or suggest other features of applicants' claims, including a substrate, and hence also fails to teach a scaffold being coupled to a substrate as recited in applicants' claim 1. Because Alivisatos fails to teach or suggest several features of applicants' claims, applicants respectfully request that the rejection of claims 1–3 over Alivisatos under 35 U.S.C. § 102(a) be withdrawn.

Claims 1–3 are rejected under 35 U.S.C. § 102(a) as allegedly being anticipated over Wybourne *et al.*, PCT Publication No. WO 98/53841. Applicants traverse this rejection and request that it be withdrawn because Wybourne is not prior to the present application. Indeed, Wybourne and the present application share the same provisional priority document.

Claims 1–3 are rejected under 35 U.S.C. § 102 as allegedly being anticipated by U.S. Patent No. 5,521,289 to Hainfeld *et al.* (Hainfeld). Applicants traverse this rejection and request that it be withdrawn. Hainfeld is concerned with making probes for biological molecules from metal clusters. In contrast, applicants' claims are directed to arrays useful for forming electronic devices. In Hainfeld, biological molecules are used to "coat" metal clusters (see, column 7, lines 48–53) rather than to form organized arrays using biological molecules, such as polylysine as scaffolds coupled to substrates. Hainfeld also fails to teach monodispersed metal clusters as recited in applicants' claims. Instead, Hainfeld teaches that the "metal core...comprises about 50–70 metal atoms." See, column 2, lines 30, 31. Thus Hainfeld's clusters are not

monodispersed but have a range of different sizes. For these reasons, applicants request withdrawal of the rejection of the claims under 35 U.S.C. § 102 over Hainfeld.

IV. Claim Rejections Under 35 U.S.C. §103

Claims 1–3 are rejected under 35 U.S.C. § 103(a) as allegedly being obvious in view of Hainfeld, either alone or in combination with applicants' specification, and Andres *et al.* Applicants traverse this rejection and request that it be withdrawn because (1) Andres is non-analogous art and thus cannot be considered for the purposes of § 103; (2) there is no suggestion or motivation to combine Hainfeld and Andres and thus the Office communication fails to establish a *prima facie* case of obviousness; (3) even if Hainfeld and Andres are improperly combined, their combination does not render applicants' claims obvious because Hainfeld and Andres fail to teach or suggest several individual features of applicants' as well as the patentable combination of such features as recited in applicants' claims.

A. The Office communication Fails to Establish a Prima Facie Case of Obviousness because Hainfeld is Non-analogous Prior Art

Before making a rejection under 35 U.S.C. § 103 "[t]he examiner must determine what is 'analogous prior art' for the purpose of analyzing the obviousness of the subject matter at issue." MPEP 2141.01(a). Only if a reference qualifies as analogous prior art can the Patent Office then consider whether the teachings of the reference render an applicant's claims unpatentable under 35 U.S.C. § 103. As is made clear by MPEP 2141.01(a) this approach is required for all statutory classes of claims, including those concerning compositions of matter. Hainfeld is non-analogous prior art, and hence the rejection of the present claims under 35 U.S.C. § 103 over Hainfeld is improper.

The Federal Circuit has established a two-prong test for determining whether a reference is analogous prior art:

- (1) is the art from the same field of endeavor (regardless of the problem addressed),
and
- (2) if the reference is not within the field of the inventor's endeavor, is the reference reasonably pertinent to the particular problem with which the inventor is involved.

In re Clay, 23 U.S.P.Q. 2d 1058, 1060–1061 (Fed. Cir. 1992); MPEP 2141.01(a).

This test applies to claims directed to all statutory classes of invention, whether they are method claims, apparatus claims, or composition claims. In the present case, Hainfeld is not analogous prior art under either of the two possibilities set forth by the Federal Circuit. Under the first test, applicants' field can be determined with reference to the specification as filed, at page 1, line 225, under the heading "Field of the Invention," which states that the field "concerns a method for forming organized arrays of metal, alloy, semiconductor and/or magnetic clusters for use in the manufacture of electronic devices, such as high density memory storage and nanoelectronic devices." Hainfeld, on the other hand, "is directed to small organometallic probes... that can be used for targeting and detecting another substance, generally, a biologically significant substance, such as an antibody." See, Hainfeld column 1, lines 5–18. Thus, applicants' field of endeavor is different than Hainfeld's, and Hainfeld does not qualify as prior art available for use under § 103 under the first prong of the Federal Circuit's inquiry.

Hainfeld also fails to qualify as analogous prior art under the second prong of the Federal Circuit's inquiry because Hainfeld does not address the problem that applicants' claimed invention addresses. Specifically, applicants' invention is directed to preparing arrays for electronic devices based on the principle of Coulomb blockade. See, for example, applicants' specification at page 3, lines 16–18. Hainfeld provides no guidance to a person of ordinary skill in the art seeking to prepare electronic devices or arrays that operate based on the principle of Coulomb blockade. Thus, Hainfeld is not pertinent to the problem that applicants address and therefore fails the second prong of the Federal Circuit's test for analogous art.

Because Hainfeld does not qualify as analogous art under either prong of the Federal Circuit's controlling case law, Hainfeld cannot be used in an obviousness inquiry against the present application. Therefore, the Patent Office has not established a *prima facie* case of obviousness and applicants respectfully request that the rejections under 35 U.S.C. § 103 be withdrawn for this reason alone.

B. The Office communication Fails to Establish a Prima Facie Case of Obviousness Because there is no Suggestion or Motivation to Combine Hainfeld and Andres

Even if Hainfeld were improperly deemed to be available as analogous art under § 103, there must be some suggestion, motivation, or teaching in the prior art that would have led a person of ordinary skill in the art to select Hainfeld and Andres and combine them in the way that would produce the claimed invention. The Office communication cites no such motivation and none appears to be available. Instead, the Office communication states that Andres "provides motivation to utilize Au50 thiol clusters with diameters less than 2 nm since [the Andres clusters] are more stable." Applicants disagree. But even if, assuming solely for the purposes of discussion, that Andres did provide such motivation, the combination does not produce applicants' claimed invention and thus cannot be the motivation relied upon to support a rejection under § 103.

Because there is no motivation or suggestion to combine Hainfeld and Andres, the Office communication fails to establish a *prima facie* case of obviousness. Applicants therefore respectfully request that the rejection of claims 1–3 under § 103 be withdrawn.

C. Even if Hainfeld and Andres were Combined, the Combination Fails to Provide Applicants' Invention

Even if Hainfeld is improperly considered to be analogous and if there were some hypothetical motivation to combine Hainfeld in Andres, such combination fails to yield applicants' claimed arrays. Specifically, neither Hainfeld nor Andres teaches or provides a motivation or suggestion to, for example, couple a biological molecule, such as a polylysine scaffold, to a substrate.

Andres is distinct from the claimed embodiments for several reasons. For example, Andres is not directed to using biological molecules such as polylysine to form arrays. Rather, Andres teaches using aryl dithiols or aryl di-isonitriles to couple metal clusters. Moreover, Andres concerns forming two-dimensional structures, monolayers, without specificity or organization. Andres' Abstract states that "[o]rganic interconnects displaced the alkyl thio molecules and covalently linked adjacent clusters in the monolayer to form a two dimensional super lattice" Also, on page 1693, Andres states that the investigation was directed to "a

general synthesis strategy for fabrication of a 2-D network of metal clusters linked by organic molecules.”

Thus, Hainfeld and Andres fail teach or provide any motivation or suggestion to couple any scaffold molecule to a substrate and certainly not to couple a polylysine scaffold to the substrate. As discussed above, Hainfeld does not involve a substrate and Andres does not teach deposition of clusters in any sort of pattern; rather Andres forms a monolayer of clusters on a platelet. Hence, Hainfeld and Andres also fail to teach, suggest or provide a motivation to produce the presently claimed arrays. Instead Hainfeld uses metal clusters to label biological molecules, such as antibodies for "detecting another substance, generally a biologically significant substance" (see, Hainfeld, column 1, lines 23,24), which provides no concept of, or suggestion to form, an array coupled to a substrate, such as the presently claimed arrays.

V. Double Patenting

Finally, claims 1–3 also are rejected as allegedly constituting double-patenting in view of claims 1–3 of U.S. Patent No. 6,872,971. Applicants note that this is a provisional rejection as claims 1–3 have not yet been deemed allowable in the present application. Applicants may respond to this rejection at the appropriate time by executing a Terminal Disclaimer as both the present application and U.S. Patent No. 6,872,971 are owned by a common Assignee.

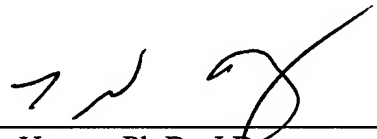
VI. Conclusion

Applicants submit that claims 1-13 are in condition for allowance. Such action is respectfully requested.

Respectfully submitted,

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